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The Causes of Corruption: Evidence from China

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Abstract:

In this study we explore in detail the causes of corruption in China using two different sets of data at the regional level (provinces and cities). We observe that regions with more anti-corruption efforts, histories of British rule, higher openness, more access to media and relatively higher wages of government employees are markedly less corrupt; while social heterogeneity, regulation, abundance of resource and state-owned enterprises substantially breed regional corruption. Moreover, fiscal decentralization is discovered to depress corruption significantly, while administrative decentralization fosters local corruption. We also find that there is currently a positive relationship between corruption and economic development in China that is mainly driven by the transition to a market economy.

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Keywords: Corruption; China; Government; Decentralization; Deterrence; Social Heterogenity

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I. INTRODUCTION

Corruption has caused vexation to the nation's leadership since the People's Republic of China was established in 1949. For example, two senior officials, Qingshan Liu and Zishan Zhang, were executed in 1952 due to corruption. Chinese leadership has tried to control corruption mainly by mass movements before 1978. Since economic reform was launched in 1978, corruption has become more and more widespread in China. Lui (1983) reports that corruption exists at every level of the political system in China. It has, for example, been reported that in 1989 the market price of coal was 674 percent of the subsidized price in China. Similarly, other producer goods were substantially higher than prices fixed by the state. As a consequence, payoffs to get supplies at state prices were very common (Rose-Ackerman, 1999). Industrial and commercial enterprises in China require government authorization to operate which promotes corruption in the area of enterprise licensing through bribery done by applicants to obtain the licenses (Manion, 1996). Lui (1983, p. 603) differentiates between three types of corruption: "the first group comprises corrupt acts such as embezzlement and bribes, which are common place among nations having a political system to speak of; the second group, such as appropriation of public goods, illegal trade, and housing irregularity, results from a breakdown in the central allocation system and is commonplace among socialist nations… But the third group of corrupt acts is rather peculiarly Chinese Communist, e.g., illegitimate feasting, feudal rites, false models, and illegal imprisonment and torture". The Chinese government has admitted that corruption "is now worse than during any other period since New China was founded in 1949. It has spread into the Party, into Government administration and into every part of society, including politics, economy, ideology and culture" (Guoqing Liang, 1994, p. 122). Two members of the Politburo, Xitong Chen and Liangyu Chen, have been successively accused of taking huge bribes in recent years. This provides anecdotal evidence of the increasing seriousness of corruption in China. Some Chinese observers have even remarked that there are no Chinese officials beyond corruption.

Rampant corruption is a distinct feature of current China, the biggest transitional and developing country. Many papers have emerged about corruption in China, most of which are written by sociologists and political scientists (for example, White, 1996; Wedeman, 2004; and Gong, 2006). As to economic studies, Yao (2002) argued that corruption in China is generated by the Chinese political system, which grants and protects privileges. Cai, Fang and Xu (2009) investigated the institutional causes of corruption among Chinese firms with a

firm-level data set. Still, there is a lack of more comprehensive economic analysis with an empirical focus about the causes of corruption in China.

There are numerous studies on the causes of corruption. Most of these are cross-national studies using subjective survey data. For instance, Treisman (2000) carried out a comprehensive cross-country study investigating the causes of corruption with several indexes of perceived corruption. This kind of study, although fruitful, cannot circumvent two problems. Firstly, subjective survey data experience some biases. Treisman (2007) pointed out that corruption perception data actually reflect impressions of intensity of corruption instead of the corruption phenomenon itself. The data consequently are correlated to the beliefs of the survey respondents and to many other social and economic conditions and hence could be biased (see also Knack, 2006). According to Bertrand and Mullainathan (2001), subjective data cannot be convincingly used as explained variables since their measurement error is associated with many other background characteristics affected by explanatory variables. Secondly, it is hard for cross-country analysis to solve omitted variable bias. Substantial unobservable or unmeasurable differences in institutions and cultures between countries make cross-country results problematic. Some researchers attempted to bypass the bias with fixed effect regressions in cross-country studies. However, according to Treisman (2007) and Knack (2006), the appropriateness of using the subjective corruption indices in the longitudinal analysis is rather questionable.

Disadvantages in cross-national research can certainly be mitigated when we use a within-country objective data set. Firstly, using objective within-country data can of course avoid biases from subjective data. Secondly, there is a higher level of homogeneity within a country though some differences still exist at a regional level. The omitted variable bias troubling cross-country analysis hence can be moderated in within-country studies. In this respect, studies of China have a unique advantage. On the one hand, China is a centralized country with unified legal and administrative systems. Furthermore the Chinese society is fairly homogenous due to the fact that the Han nationality with Confucian values is in the absolute majority in most regions. The high degree of legal and social homogeneity within China hence will help us to efficiently mitigate the omitted variable bias in an empirical analysis. On the other hand, as shown in Table 1, there are great economic differences between the rich eastern and the poor western provinces in China. In 2008 the GDP (PPP) per capita of Shanghai, which approximates that of Hungary, was about nine times as high as the GDP (PPP) per capita of Guizhou province, which is at the same level of that of Cameroon. Thus, a study of China is extremely helpful to understand the causes of corruption in

developing and transitional economies where corruption is one of the central issues. We therefore moderate the limitation of within-country analysis in line with Glaeser and Saks (2006) who analysed corruption within the US using statistics of federal corruption convictions. Surprisingly, there are hardly any papers on the causes of corruption using within-country data and most of them are working with US data. Goel and Nelson (1998) investigate the effect of government size on corruption with the American annual state-level data set. Fisman and Gatti (2002b) employ the information of the mismatch between the revenue generation and expenditure in the U.S. states to test the relationship between decentralization and corruption. Svensson (2003) use the firm-level data set from Uganda to explore the determinants of firm bribery payments. Cai, Fang and Xu (2009), as mentioned above, also employ the firm-level data to examine the "micro" causes of corruption in China.

Table 1

GDP (PPP) per capita of Chinese regions in 2008 (Intl. $)

Beijing	16577	Anhui	3810	Chongqing	4741
Tianjin	14590	Fujian	7922	Sichuan	4044
Hebei	6112	Jiangxi	3887	Guizhou	2321
Shanxi	5365	Shandong	8701	Yunnan	3310
Inner Mongolia	8472	Henan	5153	Tibet	3646
Liaoning	8221	Hubei	5223	Shaanxi	4799
Jilin	6184	Hunan	4608	Gansu	3185
Heilongjiang	5714	Guangdong	9886	Qinghai	4573
Shanghai	19232	Guangxi	3936	Ningxia	4706
Jiangsu	10421	Hainan	4517	Xinjiang	5232
Zhejiang	11102				

In this paper we adopt a similar approach to Glaeser and Saks (2006) to investigate the causes of corruption in China with regional data sets. Besides confirming most cross-country findings in a more controlled setting, our study adds to literature in several ways. Firstly, we observe a positive relationship between corruption and economic development in China due to the transition process in China. Secondly, we obtain the novel within-country evidence about the effects of the history of British rule and the abundance of the natural resource on corruption. Thirdly, we find that even in a nondemocratic country the access to partly controlled media still controls corruption.

The organization of our paper is as follows. Section II reviews previous research about causes of corruption. Section III empirically determines the causes of corruption in China focusing on a large set of factors. In Section IV we provide some concluding remarks.

II. DETERMINANTS OF CORRUPTION

We first review the possible causes of corruption implied in previous research. Since political institutions, the judicial system and cultural environment are homogenous among Chinese regions, we will focus here on other determinants of corruption. According to Jain (2001), there are three prerequisites necessary for incidences of corruption. First, that bureaucrats have discretionary power. Second, that this power is associated with economic rents. Finally, that the deterrence to corruption, as a function of the probability of being caught and penalty for corrupt act, is adequately low. The first two preconditions determine the benefit of corruption, while the last precondition influences the cost of corruption. Therefore the regional characteristics that affect these preconditions, according to Becker (1968), will determine the local incidence of corruption.

The bureaucrat's discretion over the allocation of resources is important to the existence of corruption. According to Rose-Ackerman (1978), discretionary power is mainly related to regulations. Bureaucrats can always obtain discretion to distribute resources when setting and implementing regulations. More regulations will bring in more discretionary power and therefore will also promote incidences of corruption. In contrast, levels of corruption are expected to decrease if controlled economies become more marketized.

Increasing government size enhances the discretionary power of government by enlarging the social resource that it controls. LaPalombara (1994) used a sample of countries excluding Scandinavian countries to show that the size of the government budget relative to GDP is positively correlated with levels of corruption. La Porta et al. (1999) also found empirically a positive relationship between the government transfers and subsidies and corruption. However, using the index of state interference from the *World Competitiveness Report*, Treisman (2000) could not find any solid evidence that greater state intervention is related to higher corruption.

Decentralization can influence the discretionary power of government. There is a debate upon the relationship between decentralization and corruption. According to Brennan and Buchanan (1980) and Weingast (1995), decentralization introduces competition between local governments reducing therefore the profits that bureaucrats can get being corrupt. The mechanism of entry and exit in federal states provides a strong incentive to produce public services in accordance to individuals' preferences (Hirschman, 1970). For example, exit threats of firms (higher mobility) can be a method of government control (Rose-Ackerman, 1999). Moreover federalism and local autonomy is combined with innovation. Federalism

serves as a laboratory for effective policy inventions (Oates, 1999). On the other hand, Shleifer and Vishny (1993) argue that since decentralization causes the dispersion of the government's power, bureaucrats without coordination will over extract rents from firms. Smallness and intimacy of local jurisdictions with patronage-ridden governments can promote corrupt relationships (Rose-Ackerman 1999). Treisman (2000), using a dummy variable reflecting whether a state is federal, finds that federal states are perceived to be more corrupt. However, Fisman and Gatti (2002a) report cross-country evidence that fiscal decentralization in government expenditure is significantly correlated with lower corruption. Using American data, Fisman and Gatti (2002b) also find a positive relationship between the proportion of a state's expenditure derived from federal transfers and corruption.

It is obvious that rational individuals will pay bribes only if they can get a higher marginal benefit from it. Economic rents related to discretionary powers are the necessary condition of the incidence of corruption. Discretionary powers without related rents will hardly lead to corruption. Ades and Di Tella (1999) show that countries where firms have higher rents tend to be more corrupt. Natural resource exploitation is an activity of particularly high rents that are concentrated and easily expropriable (Sachs and Warner 2001). Leite and Weidmann (1999) hence find in their empirical analysis that the incidence of corruption depends significantly on natural resource abundance. However, Treisman (2000) did not provide strong evidence that fuel and mineral exports are positively correlated with the level of corruption.

Another source of economic rent is the lack of competition. Economic rents will decrease with intensive competition in economic activities. Ades and Di Tella (1996, 1999) employ a country's openness to indicate the external competition firms face and find that the economic openness of a country, measured by the share of imports in GDP, is negatively correlated with the level of corruption in the country. Treisman (2000) also provided evidence that the share of imports in GDP is negatively associated with the corruption level. Recently, Gerring and Thacker (2005) find a similar relationship between trade openness and corruption.

The deterrence of corruption is a joint function of the possibility of being detected and punishment once caught. There are several factors affecting the probability of detection. Higher level of income accelerates the spread of education and democratic institutions and therefore enhances individuals' political involvement. It consequently enables private individuals to better identify corrupt behaviour and to punish the malfeasance of officials . As a result, regions with richer and more educated citizens are assumed to be less corrupt. According to Treisman (2007), the negative relationship between the incidence of corruption

and the income level is the strongest and most consistent finding of the empirical studies on corruption (see, e.g., La Porta et al., 1999; Ades and Di Tella, 1999 and Treisman, 2000). The probability of getting caught also depends on the effectiveness of the country's legal system. La Porta et al. (1999) argued that the common law systems in Britain and its former colonies are more effective in protecting property rights and enforcement, than the civil law systems. Probabilities of corruption being exposed therefore are higher in common law countries. Treisman (2000) indeed showed that Britain and its former colonies have a significantly lower level of corruption than other countries, while Pellegrini and Gerlagh (2008) do not find such a linkage.

Social and economic heterogeneity may also be an indirect determinant of the probability of detection. You and Khagram (2005, p. 136) argued that "the poor are more vulnerable to extortion and less able to monitor and hold the rich and powerful accountable as income inequality increases". It enables the latter to abuse their power for private gain. Income inequality therefore promotes higher levels of corruption. They then confirmed their argument with a cross-country analysis. However, Husted (1999) did not find any evidence of the relationship between income inequality and corruption. Ethnical fractionalization is also believed to promote corruption because the corrupt officials may be protected by their own ethnic groups due to political reason. Treisman (2000) and Pellegrini and Gerlagh (2007) failed to find strong evidence of this, while Glaester and Saks (2006) results support the fact that racial division is positively correlated with corruption levels in US states.

In addition, press freedom plays an important role in detecting corruption as independent journalists have incentives to investigate whether there is corruption. As a particular mechanism of external control, press freedom appears to reduce corruption. Firms and individuals can reveal the corrupt behaviour to a journalist and the possibility of a media report increases the costs for bureaucrats to be corrupt (The probability of being detected increases). In other words, the media can be seen as a platform for voicing complaints (Brunetti and Weder 2003). Adsera, Boix and Payne (2003, p. 455) point out that the "free circulation of daily newspaper" (the interaction term of a democratic measure and newspaper circulation) is negatively correlated with corruption. Brunetti and Weder (2003) find empirically that a high level of press freedom is associated with a low incidence of corruption, while Chowdhury (2004) emphasizes that press freedom controls corruption via the channel of democracy. Freille, Haque and Kneller (2007) performed a modified extreme bounds analysis to identify that the greater the press freedom the lower the level of corruption.

It is difficult to directly test the effect of punishment on corruption levels because it is difficult to compare punishment across different countries. However, higher wages imply higher opportunity costs when officials are ousted due to corruption. Van Rijkeghem and Weder (2001) find that in developing countries a higher ratio of civil service wages to manufacturing wages is significantly correlated to a lower level of corruption. However Treisman (2000) cannot provide clear evidence that higher government wages depress corruption. It is also interesting to note that in Ancient Egypt, the pharaohs searched for ways to reduce the corruption of their tax collectors (called *scribes*). The scribes were paid high salaries to reduce the incentives to enrich themselves by cheating taxpayers. Furthermore, scribes working in the field were controlled by a group of special scribes from the head office (see Adams, 1993). Rose-Ackerman (1999) stresses: "Pay increases may indeed be necessary for good performance, but only if the increases are tied to productivity and are accompanied by a reduction in the overall level of public sector employment" (p. 87).

III. EMPIRICAL ANALYSIS

The administrative division of China listed are provincial region, prefectural region and county or district. In this paper we will use two different regional data sets to explore the causes of corruption in China. The first one is a province-level data set which consists of data from all 31 provincial areas during the period 1998 to 2007 in mainland of China: 22 provinces, 5 autonomous regions and 4 municipalities. We do not include data from Hongkong, Macao and Taiwan in it because of the substantial differences in the political and legal systems between them and other parts of China.

Corruption measure in the first data set we use is derived from the *China Procuratorial Yearbooks*. We collect the number of annual registered cases on corruption in the procurator's office by region. We then divide these registered cases by regional population to get our corruption measure: regional registered cases on corruption per 100,000 people each year[a]. The definition of corruption-related crimes in Chinese Criminal Law keeps evolving until the new Criminal Law was passed by the Fifth Session of the Eighth National People's Congress of China in 1997. The Chapter VIII: Crimes of Embezzlement and Bribery in the

[a] We also performed our provincial analysis with an alternative corruption measure: the provincial number of officials investigated in registered cases on corruption per 100,000 population. Since this corruption measure is only available in the period from 2003 to 2007, we do not report here the estimation results with it, but one should note that the results are quite similar.

new Criminal Law includes all corruption-related crimes and basically remains unchanged since then. In order to ensure the comparability of the corruption data, we therefore choose the corruption data from 1998 to 2007 to investigate the causes of corruption in China. Average regional corruption data are listed in Table 2. Using conviction data has the strength of dealing with a less subjective measure of corruption offering also the opportunity to work with longer time spans. In addition, they are not subject to the problems of sampling error and survey non-response (Glaeser and Saks, 2006). On the other hand, there is the disadvantage that the conviction rate is driven by the quality of detection process. The weakness, however, will not trouble us in our current study since the quality of local judicial systems in China is basically homogeneous and we will control local anti-corruption efforts in regressions as well.

Table 2
Average annual registered cases on corruption per capita across regions in China (1998-2007)

Region	Average annual registered cases per 100,000 Pop.	Region	Average annual registered cases per 100,000 Pop.	Region	Average annual registered cases per 100,000 Pop.
Tianjin	5.01	Shaanxi	3.15	Yunnan	2.61
Heilongjiang	4.77	Qinghai	3.08	Hunan	2.59
Jilin	4.5	Ningxia	3.08	Hainan	2.59
Liaoning	4.12	Hubei	3.05	Beijing	2.59
Shanxi	3.83	Guizhou	2.95	Chongqing	2.49
Hebei	3.67	Zhejiang	2.9	Anhui	2.36
Shandong	3.61	Inner Mongolia	2.77	Sichuan	2.35
Xinjiang	3.41	Shanghai	2.77	Gansu	2.05
Fujian	3.4	Jiangsu	2.71	Guangdong	2.05
Henan	3.35	Guangxi	2.64	Tibet	1.77
Jiangxi	3.29				

The second data set we utilize is a city-level one which comes mainly from a survey on the investment climate of Chinese prefecture-level cities conducted by the World Bank and the Enterprise Survey Organization of China in 2005 (World Bank, 2007). The survey sampled 100 industrial firms in each city except for four municipalities where 200 industrial firms were sampled respectively to evaluate the investment climate of 120 cities from almost all of the Chinese provinces. Cai, Fang and Xu (2009) argue that travel and entertainment costs (ETC) can be a efficient measure of corruption in Chinese firms since "Chinese managers commonly use the ETC accounting category to reimburse expenditures used to bribe government officials, to entertain clients and suppliers, or to accommodate managerial

excess" (p. 2). And they provide strong evidence that "firm's ETC consists of a mix that includes expenditures on government officials both as 'grease money' and 'protection money', implicit CEO pay, and managerial excesses" (p. 22). Therefore we plausibly employ the average travel and entertainment costs relative to the sales of investigated firms in a city (AETC, henceforth) as a proxy for the corruption level of the city as AETC derived from representative firms in Chinese industrialized cites can indirectly reflect the overall levels of corruption there. Statistic details of this variable can be found in World Bank (2007). The detailed description of other variables utilized in the current analysis is given in the Appendix.

3.1 Province-level Analysis

To compare corruption in China, the largest developing country, to that in America, the largest developed country, our basic specification to investigate the causes of corruption is similar to that of Glaeser and Saks (2006):

$$\textit{Registered Cases on Corruption} = \alpha + \gamma \bullet \textit{Income} + \delta \bullet \textit{Education} + \eta \bullet \textit{Anti-corruption} + \beta \bullet \textit{Other regional characteristics} + \textit{Error term}$$

We measure the regional income level using the logarithm of real Gross Regional Product per capita and the level education with the proportion of the regional population over 6 that have completed a college degree. This is consistent with Glaeser and Saks (2006) who also included the regional income and education level in their specifications. We also try to get a measure of regional anti-corruption efforts among the control variables. Since the law systems in different Chinese regions are the same, the difference in the anti-corruption efforts of the various regions lies in the individual regional legal enforcements against corruption. We hence use, similar to Goel and Nelson (1998), the real per capita expenditure on police, procuratorate, court and judiciary by local government as a proxy for the regional anti-corruption effort. Controlling for anti-corruption efforts is insofar useful as provincial registered cases on corruption may also reflect the effort that local governments have made to fight against corruption (Treisman, 2007). We also add in our cross-sectional analysis a geographic dummy that is equal 1 for the provinces in North China. The dummy variable takes into account that there are cultural differences between North and South China. These cultural differences may be driven by individualism, one of Hofstede's five cultural dimensions (Hofstede and Hofstede, 2005). People in North China are more collectivistic

than people in South China (Eberhard, 1965). Interestingly, Banfield (1958) and Hooper (1995) have confirmed a link between the propensity to favour in group members (collectivism) and official corruption in Spain and Italy respectively. Thus, we may predict that a higher level of collectivism might lead to more frequent incidences of corruption in North China.

We first run cross-sectional regressions with a 10-year average of corruption variable to mitigate the data noise problem, which was similar to the one that Glaeser and Saks (2006) confronted. To deal with the potential reverse causality between the income level and the incidence of corruption which Treisman (2000) and Glaeser and Saks (2006) pointed out, we, according to Hall and Jones (1999) and Rappaport and Sachs (2003), use geographic characteristics (latitudes of provincial capitals and a dummy variable indicating provincial proximities to oceans) as instruments for the provincial levels of income. Our selection of instrumental variables is mainly based on the long-standing fact that there exists both an economic fault line between North China and South China since the Song dynasty, and also a great income gap between coastal and inland provinces in China since the opening of the treaty ports in the late Qing dynasty (Li, 2001). Our selected geographic instruments are highly correlated with these regional disparities and hence also with regional economic development. Furthermore we cannot image that the instrumental variables affect corruption directly or through channels other than economic development. We therefore have reason to believe that our instruments are valid. Due to the lack of valid instruments, we adopt the lagged value (data from the 1990 Census) of the education variable in regressions to address the similar endogeneity problem of the variable education.

Our cross-sectional analysis using the IV approach, though addressing the problems of endogeneity and data noise, has the problem of small sample size. We therefore then operate a panel analysis using fixed effects regressions with a large panel sample. The panel analysis controls the endogeneity problem and the data noise by regional fixed effects and time fixed effects. However, it is obvious that time fixed effects can only control part of the data noise. Moreover, fixed effects regressions cannot correct the bias caused by the time-varying omitted variables. The causes of corruption in China therefore can be better explained by the combination of both IV and fixed effects results.

3.1.1 Deterrence and Corruption

In this section, we will empirically test the relationship between deterrence and corruption. We first examine the correlation between corruption and income, education and anti-

corruption effort. Our approach is similar to the one conducted by Glaeser and Saks (2006). This has the advantage that we are better able to compare the results between the biggest developed market economy (US) and the largest developing and transitional economy. The results are presented in Table 3. It can be seen that income is positively correlated with corruption in China. In estimations the coefficient is statistically significant. This relationship seems at first glance puzzling since it contradicts the previous literature. However, such a result might be driven by the transitional nature of Chinese society. It is worth noting that countries making the transition to a market economy often experience unprecedented corruption during their transition (Levin and Satarov, 2000 and Paldam and Svendsen, 2000). According to the World Bank (2000, p.vii), "the simultaneous processes of developing a market economy, designing new political and social institutions and redistributing social assets have created fertile ground for corruption" in transitional countries. The increase in corruption in these countries seemed therefore to be a consequence of the transition. Specifically, China started its transitional process with economic reform loosening up the economy while political reform lagged behind. Government hence continues to play an extensive role in the economic environment in the absence of institutional and legal constraints. One of the consequences is unavoidably corruption. Furthermore, this kind of corruption will be more pervasive if government power is widened through increased economic activities. Thus, regions with a higher level of income might therefore be more corrupt.

In order to determine the direction of the causality between income and corruption, we as discussed previously adopted the instruments for income, namely latitudes and proximities to oceans in our regressions. These instruments have proven to be suitable for income level and passed the identification test and the weak identification test in our case (Table 3). Similar to Gundlach and Paldam (2009), the main direction in the circular relationship between income and corruption in China is from income to corruption since the Hausman tests show that the IV estimates do not differ systematically from the corresponding OLS estimates in all the cross-section regressions reported in Table 3, which means there is not significant upward bias caused by reverse causality. This result, which is robust when including more control variables, supports our explanation about the positive relationship between income and corruption.

Table 3

Relationship between annual corruption rate and levels of income, education and anti-corruption efforts

	Average Annual Cases (1998-2007)				Annual Cases (1998-2007)	
	OLS		IV		Pooled-OLS	Fixed effects
	(1)	(2)	(3)	(4)	(5)	(6)
Income	0.95***	0.89**	1.16***	1.15***	0.61***	0.56**
	(0.30)	(0.34)	(0.33)	(0.33)	(0.11)	(0.22)
Education		0.090		0.063	0.045***	0.029
		(0.13)		(0.12)	(0.018)	(0.020)
Anti-corruption	-0.0055***	-0.0070***	-0.0061***	-0.0074**	-0.0070***	-0.0053***
	(0.0015)	(0.0025)	(0.0016)	(0.0031)	(0.00073)	(0.00081)
North	0.81***	0.73***	0.74***	0.71***	0.72***	
	(0.20)	(0.20)	(0.19)	(0.19)	(0.097)	
Constant	-4.94*	-4.36	-6.64**	-6.54**	-2.30**	-2.17
	(2.47)	(2.79)	(2.71)	(2.72)	(0.98)	(1.94)
1st stage F			51.17	128.69		
			[0.00]	[0.000]		
OverID test			2.22	2.13		
			[0.14]	[0.15]		
Weak ID test			20.34	20.34		
			{19.93}	{19.93}		
Hausman test			1.38	3.25		
			[0.71]	[0.52]		
Time fixed effects						Yes
Region fixed effects						Yes
Observations	31	31	31	31	310	310
R-squared	0.52	0.53	0.51	0.52	0.33	0.56

Notes:

a. Robust standard errors in parentheses, p-values in brackets, critical values in braces, *** p<0.01, ** p<0.05, * p<0.1.

b. Unless noted otherwise, we hereafter use the value in 1990 of the education variable, the average value during 1997-2006 of the anti-corruption efforts variable and the values in 1997 of the other explanatory variables in the cross-section regressions. And we utilize the one-year lagged values of explanatory variables henceforth in the panel regressions.

We then perform fixed-effects regressions with the panel data from 1998 to 2007. We use lagged values of levels of income and education in the regressions since registered cases on corruption in one year actually reflect the number of corrupt acts done previously but detected in the year. We consider time fixed effects in our panel estimation to control anti-corruption campaigns the Chinese government launched in some years within our investigation period. The panel results shown in Table 3 are generally in line with our cross-sectional findings. The coefficient for income is in both cases statistically significant. We also observe a positive relationship between education and corruption. However, the coefficient is mostly not statistically significant. On the other hand, we observe that the anti-

corruption efforts significantly depress corruption in China. Last but not least, we find in Table 3 that in line with our prediction, northern provinces have significantly higher levels of corruption than southern provinces in China.

We now explore whether the negative relationship between income and corruption in literature will emerge in China. Basu and Li (2000) predicted theoretically that corruption levels in transitional countries will decrease after these countries establish or improve institutions, effectively checking the abuse of public office as the transition processes move on. The depressing influence of income level on corruption will then dominate. This prediction has been confirmed in several Eastern European countries (World Bank, 2006). Primary evidence of this trend in China is shown in Table 4, where the size of the positive effect of income on corruption during 2003-2007 is 30% lower than that during 1998-2002, which implies that the positive effects of income on corruption levels in China do decrease as reforms continue.

Table 4

The Effect of income on corruption rate in 1998-2002 and 2003-2007

	Average Annual Cases (1998-2002)		Average Annual Cases (2003-2007)	
	(1)	(2)	(3)	(4)
Income	1.33***	1.30***	0.97***	0.96***
	(0.39)	(0.39)	(0.30)	(0.30)
Education		0.044		0.062
		(0.14)		(0.10)
Anti-corruption	-0.0088***	-0.010**	-0.0042***	-0.0051***
	(0.0030)	(0.0049)	(0.0010)	(0.0016)
North	0.79***	0.78***	0.70***	0.66***
	(0.23)	(0.22)	(0.17)	(0.18)
Constant	-7.90**	-7.69**	-5.17**	-5.06**
	(3.24)	(3.21)	(2.52)	(2.51)
Observations	31	31	31	31
R-squared	0.48	0.49	0.49	0.50

Notes:

a. Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1.

b. We here adopt the average values during the periods of 1998-2002 and 2002-2007 of the Anti-corruption effort variable in the first two columns and the others respectively.

Further evidence about the tendency of the relationship between income and corruption is provided in Table 5. We measure the change in corruption by the difference between the provincial average corruption rates over the 5-year periods 1998–2002 and 2003–2007, and then regress the change on the initial levels of income, education and corruption (averages in the period 1998-2002). The strong negative coefficients on the initial corruption level in the

regressions may show that provincial corruption levels will converge to their steady state levels over time after the transitional shocks initially caused them to depart from their steady state levels. Furthermore, provinces with higher levels of income seem to have experienced larger decreases in corruption during the past decade although one should note that the coefficient is statistically insignificant. In summary, all evidence here implies that as predicted theoretically, the negative effect of income on corruption in China may emerge in the future.

Table 5

Relationship between the change in corruption and initial levels of income, education and corruption

	Change in corruption between 1998-2002 and 2003-2007		
	(1)	(2)	(3)
Income		-0.099	-0.026
		(0.25)	(0.24)
Education	0.051		0.051
	(0.041)		(0.039)
Average Annual Cases	-0.33***	-0.29***	-0.32***
(1998-2002)	(0.049)	(0.057)	(0.058)
Difference in anti-corruption	-0.0031*	-0.0011	-0.0031
between 1998-2002 and 2003-2007	(0.0016)	(0.0019)	(0.0022)
Constant	0.80***	1.44	1.00
	(0.23)	(1.91)	(1.82)
Observations	31	31	31
R-squared	0.51	0.50	0.51

Notes:

Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1.

Traditional media in China, such as newspaper, radio and television is owned and therefore fully controlled by the state, while internet as a new media, though also censored by Chinese government, is relatively less constrained due to its technical flexibility. Actually there are many recent cases in China where internet users uncover official malfeasance and corruption of officials in order to force them out of office (Freedom House, 2009). A question hence emerges whether we can expect media to effectively act as an external control of corruption in China as suggested by Brunetti and Weder (2003) from an international perspective. We here employ the regional newspaper circulation per capita (following Pellegrini and Gerlagh, 2008) and provincial internet penetration rates to investigate the effects of media, controlled or partly controlled, on corruption in China.

Table 6

Relationship between corruption rate and media

	Average Annual Cases (1998-2007)			Annual Cases (1998-2007)		
	IV			Fixed effects		
	(1)	(2)	(3)	(4)	(5)	(6)
Newspaper	0.0029		-0.029**	-0.0048***		-0.0049***
	(0.0062)		(0.011)	(0.00063)		(0.00064)
Internet		-0.61**	-1.25***		-0.0063	-0.013
		(0.25)	(0.30)		(0.022)	(0.016)
Income	1.09***	0.86***	1.21***	0.55***	0.56**	0.56***
	(0.35)	(0.25)	(0.31)	(0.20)	(0.22)	(0.20)
Education	0.053	0.31**	0.65***	0.10***	0.032	0.11***
	(0.13)	(0.14)	(0.16)	(0.017)	(0.023)	(0.019)
Anti-corruption	-0.0076**	-0.0069***	-0.0040**	-0.0044***	-0.0051***	-0.0040***
	(0.0032)	(0.0024)	(0.0018)	(0.00061)	(0.00091)	(0.00075)
North	0.73***	0.66***	0.37*			
	(0.21)	(0.18)	(0.22)			
Constant	-5.99**	-4.30**	-7.35***	-2.62	-2.19	-2.67
	(2.94)	(2.03)	(2.66)	(1.79)	(1.94)	(1.79)
Observations	31	31		308	310	308
R-squared	0.52	0.62		0.62	0.56	0.62
Time fixed effects				Yes	Yes	Yes
Region fixed effects				Yes	Yes	Yes

Notes:

a. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

b. We here use the value of internet penetration rates in 1998 in the cross-section regressions.

Evidence in Table 6 seems to be moderate. Controlling levels of income, education and anti-corruption efforts, we find in cross-sectional regressions (the first three columns) that the internet media play an important role in disclosing bureaucratic corruption in China while the role of traditional media here seems to be weaker (statistically significant with a negative sign in specification (3)). However, the panel estimation results in the last three columns show that the traditional media newspapers significantly depress corruption in China while internet media do not. Nevertheless, the overall tendency suggest that both traditional and internet media in China do exert negative effects on corruption even if they are (partly) controlled by the Chinese government. Anti-corruption, as long as it is held within limits, can also be in the interest of nondemocratic governments.

Now we briefly review the modern history of China before we explore the impact of the common law system on corruption in China. During the last period of Qing Dynasty (1840-1911), China was beaten in a sequence of wars against foreign colonial powers. As a result, foreign powers including Britain carved spheres of influence out of China through a series of

unequal treaties. They, according to their own values, influenced or even reconstructed the local administration systems including the legal system, infrastructure and education within the domains they controlled. These influences may persist to cause some regional differences in current China. We hence introduce a dummy indicating whether a province was in the influence sphere of Britain in the late Qing Dynasty, to capture the influence of the common law system on current Chinese provinces.

Table 7
Influence of the common law system on corruption rate

	Average Annual Cases (1998-2007)			Annual Cases (1998-2007)		
	IV			Fixed effects		
	(1)	(2)	(3)	(4)	(5)	(6)
British	-0.18		-0.11	-0.21**		-0.18*
	(0.15)		(0.21)	(0.088)		(0.093)
Church university		-0.46***	-0.45***		-0.21***	-0.20***
		(0.17)	(0.17)		(0.078)	(0.077)
income	1.11***	1.70***	1.66***	0.58**	0.69***	0.70***
	(0.31)	(0.37)	(0.37)	(0.22)	(0.24)	(0.24)
education	0.090	0.060	0.077	0.026	0.029	0.027
	(0.12)	(0.13)	(0.12)	(0.020)	(0.019)	(0.020)
Anti-corruption	-0.0079***	-0.0086**	-0.0088***	-0.0052***	-0.0056***	-0.0055***
	(0.0026)	(0.0034)	(0.0031)	(0.00081)	(0.00080)	(0.00080)
North	0.54***	0.35	0.25			
	(0.15)	(0.23)	(0.24)			
Constant	-6.01**	-10.75***	-10.28***	-2.35	-3.36	-3.47
	(2.57)	(2.95)	(2.97)	(2.00)	(2.10)	(2.15)
Observations	31	31	31	310	310	310
R-squared	0.53	0.57	0.57	0.56	0.57	0.57
Time fixed effects				Yes	Yes	Yes
Region fixed effects				Yes	Yes	Yes

Notes:
Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Specifically, education founded by Britain and the US in China, might be the key point to the historical influence of the common law system. F.L. Hawks Pott, the president of Saint John's University founded by the American Episcopal Church, said in 1890: "in our school, we trained China's future teachers and propagators, making them the leaders and comperes in the future and casting the greatest influences on the future China"(Yang and Ye, 1993, p. 289). Soochow University founded by the American Methodist Missionaries in 1900 was very famous for its education on Anglo-American law in China. We therefore also use the numbers of church universities founded by Britain and the US in each province till 1922 to proxy for the historical influence of the common law system. Results in Table 7 show the

tendency that provinces affected by the British common law system historically have a lower level of corruption than the other provinces in China, which is consistent with Treisman's (2000) cross-country finding.

In Table 8 we turn to the role of social heterogeneity. Firstly, in line with the cross-country finding, we observe that higher income inequality measured by Gini coefficients (Meng, Gregory and Wang, 2007) significantly raises the incidence of corruption in China. Secondly, we test the relationship between racial fractionalization and corruption in China. As discussed before, ethnic fractionalization may have a positive effect on corruption since corrupt officials may be still supported by their own ethnic groups due to political reason. In China the Han nationality is the major nationality, which accounts for, according to the national census in 2000, 91.6% of the total population of China although there are altogether 56 nationalities in China[2]. In provinces such as Jiangsu and Shanxi where almost all (more than 99.6%) residents belong to the Han people, the influence of ethnic diversity is probably not perceived since ethnic minorities there might be too small to protect the corrupt officials. We therefore need to control the regional population share of Han nationality when we investigate the effect of ethnic fractionalization on corruption. We measure the ethnic fractionalization in China with the dissimilarity index. It is calculated as one minus a Herfindahl concentration index, $1-\sum s_i^2$, where s_i is the population share of nationality i, from the national census in 2000. We use the values derived from the 2000 national census to depict the ethnic fractionalization in Chinese provinces in the investigation period because the provincial nationality compositions of population in China are relatively stable during a decade. However, it prevents us from running fixed effects regressions in our panel analysis. We instead perform the Pooled OLS regressions controlling time fixed effects in the panel section. The empirical findings support our analysis: the population share of Han nationality is negatively correlated with corruption. Controlling regional population shares of Han nationality, we further find that the dissimilarity index is negatively associated with the local corruption level (see Table 8). Given that the Han nationality dominates in most Chinese provinces, a small regional dissimilarity index may imply that there is at least one ethnic minority in the province that is populous enough to shelter its corruption officials. The

[2] There are 56 ethnic groups in China. Except the Han nationality, other 55 ethnic groups in China are customarily referred to as ethnic minorities. According to the national census in 2000, 37 ethnic minorities have a population of less than one million. Among them, there are 20 ethnic groups with a population of below 100,000. The smallest ethnic group, Lhoba, only has the population of 2,965. Like the Han people, ethnic minorities also can be found throughout the country.

negative relationship between the dissimilarity index and corruption actually means that ethnic fractionalization promotes local corruption in Chinese provinces. Combining the above findings, we then conclude that ethnic fractionalization increases corruption in China.

Table 8

Relationship between corruption rate and social heterogeneity

	Average Annual Cases (1998-2007)			Annual Cases (1998-2007)		
	IV			FE	Pooled OLS	
	(1)	(2)	(3)	(5)	(6)	(7)
Gini	9.42**			7.12**		
	(4.78)			(3.58)		
Han		-0.013*	-0.021**		-0.0045**	-0.0054*
		(0.0075)	(0.0093)		(0.0023)	(0.0031)
Dissimilarity			-1.17*			-0.33
			(0.63)			(0.27)
Income	1.61***	1.53***	1.10**	0.68*	0.89***	0.24
	(0.41)	(0.43)	(0.45)	(0.35)	(0.15)	(0.17)
Education	0.43***	0.21*	0.098	-0.062	0.10***	0.017
	(0.16)	(0.12)	(0.14)	(0.057)	(0.022)	(0.031)
Anti-corruption	-0.018***	-0.012***	-0.014***	-0.0011	-0.0095***	-0.0093***
	(0.0048)	(0.0037)	(0.0040)	(0.0047)	(0.0011)	(0.0013)
North	0.51**	0.56***	0.40**			
	(0.22)	(0.20)	(0.19)			
Constant	-12.24***	-8.37***	-4.25	-4.51	-4.55***	0.80
	(3.72)	(3.01)	(2.91)	(2.94)	(1.28)	(1.41)
Observations	30	31	31	120	310	310
R-squared	0.56	0.54	0.66	0.60	0.32	0.41
Time fixed effects				Yes	Yes	Yes
Region fixed effects				Yes	No	No

Notes:

a. Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1.
b. We do not have the Gini Coefficients of Tibet.
c. We also control provincial shares of urban population in specifications (3) and (7) as people from the same ethnic group often gather together in rural area hence exert stronger effect on corruption than those in urban area.

Finally we explore the effect of the public sector's relative wage, which can be seen as a proxy for the public officials' opportunity cost to behave corrupt. Consistent with the cross-country evidence reported by Treisman (2000), our results in Table 9 strongly support previous theoretical prediction that the relative wage is negatively correlated with the incidence of corruption.

Table 9

Relationship between corruption rate and relative wage of the public sector

	Average Annual Cases (1998-2007)	Annual Cases (1998-2007)
	IV	Fixed effects
	(1)	(2)
Relative wage	-2.80**	-0.54*
	(1.17)	(0.32)
income	1.68***	0.56***
	(0.42)	(0.21)
Education	-0.029	0.027
	(0.13)	(0.020)
Anti-corruption	-0.0074**	-0.0052***
	(0.0034)	(0.00079)
North	0.55**	
	(0.22)	
Constant	-7.73***	-1.59
	(2.72)	(1.95)
Observations	31	310
R-squared	0.48	0.56
Time fixed effects		Yes
Region fixed effects		Yes

Notes:

a. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

b. We use the average values of relative wages of government employee during 1997-2006 in the cross-section regression.

3.1.2 Discretionary Power, Economic Rents and Corruption

Lord Acton, a British historian in 19th century, remarked: "Power tends to corrupt, and absolute power corrupts absolutely."[3] In this subsection we therefore explore the relationship between discretionary power, related economic rents and corruption in China.

In Table 10 we first examine the relationship between fiscal decentralization and the regional corruption level. Following Zhang and Zou (1998), we measure fiscal decentralization in China with the ratio of per capita provincial consolidated spending to per capita central consolidated spending. Due to the fact that our fiscal decentralization variable is highly correlated with income we only report panel regressions with this variable. In specification (3) we can observe that fiscal decentralization decreases local corruption levels. Such a finding is consistent with Fisman and Gatti (2002a, 2002b). Actually Montinola, Qian and Weingast (1998) argued that China has a unique market-preserving federal system where

[3] Lord Acton, 1887, Letter to Bishop Mandell Creighton.

local governments have strong fiscal incentives to support local business development and hence restrict their own predation on local enterprises. The view of Shleifer and Vishny (1993) that decentralization results in "excess" rent extraction due to the lack of coordination among officials therefore may not apply in China.

Table 10

Relationship between corruption rate and discretionary power of the local government

	Average Annual Cases (1998-2007)		Annual Cases (1998-2007)		
	IV		Fixed effects		
	(1)	(2)	(3)	(4)	(5)
Fiscal decentralization			-0.019***		
			(0.0059)		
Government size	0.079			0.052*	
	(0.053)			(0.028)	
Marketilization		-0.20***			-0.22**
		(0.076)			(0.086)
Income	1.27***	2.19***	0.60***	0.58***	1.63***
	(0.32)	(0.53)	(0.22)	(0.21)	(0.56)
Education	-0.055	0.32***	0.029	0.0041	0.018
	(0.14)	(0.094)	(0.020)	(0.022)	(0.031)
Anti-corruption	-0.0061*	-0.018***	-0.0049***	-0.0052***	-0.0089***
	(0.0033)	(0.0038)	(0.00081)	(0.00079)	(0.0015)
North	0.79***	0.32			
	(0.20)	(0.25)			
Constant	-8.36***	-13.65***	-2.51	-2.72	-9.89**
	(2.83)	(4.023)	(1.95)	(1.92)	(4.52)
Observations	31	30	310	310	155
R-squared	0.51	0.55	0.56	0.56	0.60
Time fixed effects			Yes	Yes	Yes
Region fixed effects			Yes	Yes	Yes

Notes:

a. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

b. We use the marketization index in 1997 in the cross-sectional analysis and those from 2001to 2005 in our panel analysis.

We then turn to the linkage between the provincial government size and local corruption rates. Similar to LaPalombara (1994), we utilize the ratio of regional consolidated revenue to Gross Regional Product to measure the provincial government size. We find that the provincial corruption rate appears to increase with the provincial government size, which is consistent with previous studies such as Goel and Nelson (1998). The Chinese market-preserving federal system, which to some extent limits local governments' expropriation, might account for the weak effect of local government size here. We finally investigate the effect of government regulation on local corruption level. Here we use the provincial

marketization index of China from Fan, Wang, and Zhu (2001, 2006) to measure the provincial government regulation. With 19 indicators, the index covers five main aspects of the Chinese marketization: the relationship between the market and the government, the growth of the non-state economy, the development of the product market, the development of the factor market, and the market environment including intermediaries and institutional and jurisdictional arrangements. Thus, this index is negatively related to the degree of regulation since marketization is connected with the deregulation of government. Unlike Treisman (2000) and Glaeser and Saks (2006), our regressions including the provincial marketization index, strongly confirm that government regulations promote while deregulation depresses corruption in China.

We now focus on the role of economic rents. In this instance we are going to test the associations between the corruption level and several other factors influencing the scale of economic rents in China. We first find in Table 11 that regional trade openness, measured by the regional share of imports in Gross Regional Product, significantly lowers the provincial level of corruption in China. The fixed effects approach in our estimation addresses the potential simultaneity bias suggested by Treisman (2000). The abundance of natural resources is hypothesized to be an inducement to corruption because of the associated economic rents. Since the export share of natural resources, proposed by Ades and Di Tella (1999), is not suitable to measure the regional abundance of natural resource in within-country analysis, we, following Xu and Wang (2006), use the fraction of employment in the mining and quarrying sector as a proxy for the provincial abundance of natural resources in China. The results in Table 11 indicate that the abundance of natural resources is significantly correlated with higher level of corruption.

We further investigate the relationship between the size of the state-owned enterprise sector and corruption. The state-owned enterprise sector plays an important role in Chinese economy. Due to the soft budget constraints and the lack of monitoring, managers and officials who have rights over the state-owned enterprises they administrate can easily extract economic rents from the state-owned enterprises. Abundant economic rents in the state-owned enterprises are within easy reach of them. Therefore the corruption level might be positively correlated with the size of the state-owned enterprise sector. Using the share of employment of the state-owned enterprise sector as a proxy for its size, we provide clear evidence that the state-owned enterprise sector is one of the sources of corruption in China.

Table 11

Relationship between corruption rate and economic rents

	Average Annual Cases (1998-2007)			Annual Cases (1998-2007)		
	IV			Fixed effects		
	(1)	(2)	(3)	(4)	(5)	(6)
Openness	-0.017***			-0.020***		
	(0.0060)			(0.0037)		
Resource		0.057**			0.054***	
		(0.026)			(0.013)	
State-owned			3.32*			3.32**
			(2.06)			(1.41)
Income	1.22***	1.26***	1.04***	0.73***	0.59***	0.43*
	(0.32)	(0.32)	(0.32)	(0.22)	(0.21)	(0.24)
Education	0.11	0.049	-0.045	0.065***	0.023	-0.0045
	(0.088)	(0.12)	(0.13)	(0.019)	(0.019)	(0.028)
Anti-corruption	-0.0055**	-0.0065**	-0.0072***	-0.0029***	-0.0043***	-0.0051***
	(0.0027)	(0.0031)	(0.0027)	(0.00097)	(0.00081)	(0.00088)
North	0.66***	0.48**	0.54***			
	(0.19)	(0.24)	(0.20)			
Constant	-7.24***	-7.79***	-5.73**	-4.34**	-2.92	-1.12
	(2.71)	(2.65)	(2.60)	(2.01)	(1.89)	(2.14)
Observations	31	31	31	310	310	248
R-squared	0.56	0.55	0.56	0.58	0.58	0.60
Time fixed effects				Yes	Yes	Yes
Region fixed effects				Yes	Yes	Yes

Notes:

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

3.1.3 Panel Data Evidences

We now perform a panel data analysis with full specification using a panel of 31 Chinese provincial regions over a period of ten years to test the robustness of our previous results. The main explanatory variables in the previous regressions are all included in our current specifications. We successively adopt pooled-OLS, FGLS and fixed effects approaches to re-examine the above results. We use the feasible generalized least squares method here in order to allow estimation in the presence of autocorrelation within panels and heteroskedasticity across panels. Our panel results are presented in Table 12. Results in columns of Table 12 are similar in general, which shows the robustness of the obtained findings. More importantly, panel estimates here are consistent with previous estimates though the correlations between some independent variables make their estimation less precise, especially when the sample size decreases. It therefore shows that our empirical findings about the determinants of the provincial corruption rate in China are robust to the different specifications and econometric methods. To compare the relative strength of determinants of corruption in China, we also list

their standardized (beta) coefficients in specifications (5) and (6) in Table 12. The last question that remains to be examined in our current study therefore is whether our findings are still robust when applying them to a different data set. To answer this question we will, in the next subsection, explore the city-level data set instead of the current province-level data.

Table 12

Relationship between corruption rate and its determinants: panel data analysis

	Annual Cases (1998-2007)							
	Pooled-OLS		FGLS		Fixed effects			
	(1)	(2)	(3)	(4)	(5)		(6)	
Income	1.47***	2.81***	1.08***	2.72***	0.83***	[0.54]	2.39***	[1.29]
	(0.18)	(0.46)	(0.19)	(0.37)	(0.20)		(0.57)	
Education	0.095***	0.059*	0.058***	0.031	0.11***	[0.46]	0.065**	[0.25]
	(0.021)	(0.036)	(0.020)	(0.027)	(0.018)		(0.031)	
Anti-corruption	-0.0046***	-0.00072	-0.0039***	-0.0015	-0.0037***	[-0.35]	-0.0022	[-0.17]
	(0.0011)	(0.0031)	(0.0013)	(0.0021)	(0.0010)		(0.0031)	
Newspaper	-0.0027***	-0.0033***	-0.0016*	-0.0019*	-0.0037***	[-0.35]	-0.0046***	[-0.38]
	(0.00059)	(0.0011)	(0.00082)	(0.0011)	(0.00073)		(0.0012)	
University	-0.33***	-0.42***	-0.19***	-0.26***	-0.10	[-0.083]	-0.30**	[-0.22]
	(0.072)	(0.12)	(0.066)	(0.096)	(0.074)		(0.13)	
Han	-0.0027	0.0038	-0.0013	-0.00016	-0.0066**	[-0.15]	0.0027	[0.057]
	(0.0023)	(0.0054)	(0.0030)	(0.0043)	(0.0027)		(0.0054)	
Relative wage	-0.43	-1.09*	-0.36	-1.25***	-0.64**	[-0.084]	-1.13*	[-0.12]
	(0.31)	(0.59)	(0.32)	(0.48)	(0.31)		(0.66)	
Decentralization	-0.034***	-0.28***	-0.016**	-0.27***	-0.021***	[-0.087]	-0.20**	[-0.47]
	(0.0058)	(0.088)	(0.0065)	(0.069)	(0.0038)		(0.096)	
Openness	-0.0079*	-0.0049	-0.0060	-0.0057	-0.0071*	[-0.17]	0.0012	[0.027]
	(0.0041)	(0.0069)	(0.0041)	(0.0061)	(0.0044)		(0.0073)	
Resource	0.070***	0.038	0.058***	0.039*	0.047***	[0.19]	0.038**	[0.13]
	(0.014)	(0.024)	(0.015)	(0.020)	(0.014)		(0.019)	
Marketilization		-0.30***		-0.25***			-0.39***	[-0.75]
		(0.090)		(0.070)			(0.12)	
Constant	-10.48***	-18.43***	-6.90***	-18.45***	-4.41**		-14.96***	
	(1.51)	(3.53)	(1.64)	(2.89)	(1.80)		(4.49)	
Observations	308	154	308	154	308		154	
R-squared	0.55	0.58			0.65		0.68	
Time fixed effects	Yes	Yes	Yes	Yes	Yes		Yes	
Region fixed effects	No	No	No	No	Yes		Yes	

Notes:

a. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Beta coefficients in Brackets.

b. Since we only have the Gini Coefficient data during 1997-2000, we do not introduce it into our panel regressions here in order not to worsen the multicollinearity problem due to the sharp decrease in sample size.

3.2 City-level Analysis

Using an alternative data set at the city-level gives us the chance to check the robustness of the above findings. Specifically we will use a different corruption measure (AETC) to replicate the above analysis. As discussed before, AETC is the average travel and entertainment costs relative to the sales of investigated firms in Chinese cities in the survey conducted by World Bank in 2005. Prior literature (World Bank, 2007, Cai, Fang, and Xu, 2009) has proved that the travel and entertainment costs relative to the sales of firms are the eligible indirect measure for corruption in Chinese cities. However, one should note that less data is available at the city level. For example, we are not able to explore the effect of social heterogeneity on corruption in Chinese cities.

Similar to province-level analysis, our baseline specification here is

$$AETC = \alpha + \gamma \bullet log\ (Industrial\ output\ per\ worker) + \delta \bullet Education + \eta \bullet Anti\text{-}corruption + \beta \bullet Other\ city\ characteristics + Error\ term$$

Since corruption indicators here are drawn from industrial firms, we accordingly use the industrial output per worker in 2003 to reflect local economic development, which is plausible since China is undergoing industrialization. We also employ fractions of workers with college completed in 1991 to represent the education levels of cities (lagged values). The average confidence in the courts of local firms investigated is utilized as a proxy for local anti-corruption efforts since impartial and efficient courts can prevent expropriation and hence can significantly promote anti-corruption. We will not adopt the same dummy as in the province-level analysis to proxy cultural difference. Cities in our data set are the most developed areas in China and attract people from different parts of the country. The culture in these cities is hence mixed and difficult to identify. We instead generate a dummy "big city" to control the difference of the administration authority between cities. It indicates whether a city belongs to a group of cities with more autonomy rights both in lawmaking and administration and which contains municipalities, capitals of provinces. These cities are specifically designated in the state plan and special economic zones in China. This dummy actually reflects the different degrees of administrative decentralization among Chinese cities (Cai and Treisman, 2006). We will discuss this political decentralization dummy together with the fiscal decentralization variable later.

To deal with the endogeneity problem of the economic development discussed previously, we similarly use geographic characteristics, namely the longitudes of cities and a dummy variable indicating whether a city is in the coastal areas, as instruments for economic development. Unlike previously implemented, we use here the number of colleges and universities in each city in 1948 (before the establishment of the People's Republic of China) as an instrumental variable for the education level of the city to deal with the potential reverse causality between education and corruption.

Due to the data limitations, we are only able replicate the main part of the province-level analysis. We first re-examine the relationship between corruption and the levels of economic development and education in Chinese cities. Results are shown in Table 13.

Table 13

Relationship between corruption and levels of economic development and education in Chinese cities

	AETC (2005)					
	OLS			IV		
	(1)	(2)	(3)	(4)	(5)	(6)
Income	-0.20**		-0.20**	-0.25		-0.34*
	(0.085)		(0.089)	(0.21)		(0.18)
Education		0.0095	0.010		-0.044	-0.0044
		(0.011)	(0.011)		(0.035)	(0.024)
Anti-corruption	-0.011***	-0.011***	-0.011***	-0.012***	-0.013***	-0.011***
	(0.0021)	(0.0022)	(0.0022)	(0.0022)	(0.0027)	(0.0023)
Big city	0.22***	0.15*	0.21**	0.24**	0.20**	0.26**
	(0.080)	(0.083)	(0.080)	(0.11)	(0.098)	(0.11)
Constant	4.20***	1.73***	4.15***	4.84*	2.23***	5.99***
	(1.03)	(0.20)	(1.03)	(2.53)	(0.39)	(2.16)
1st stage F				13.77		14.95
(income)				[0.00]		[0.00]
1st stage F					8.78	8.20
(education)					[0.00]	[0.00]
Observations	120	120	120	120	120	120
R-squared	0.25	0.23	0.26	0.25	0.08	0.23

Notes:

a. Robust standard errors in parentheses, p-values in brackets . *** p<0.01, ** p<0.05, * p<0.1.

b. Unless noted otherwise, we henceforth use the value in 1991 of the education variable, the value in 2003 of the income variable, and the value in 2004 of the anti-corruption strength variable in our regressions.

Our results show that the economic development weakly depresses the corruption level of the prefecture-level cities in China. The cities investigated here are the most developed areas in China since they only cover 36% of prefecture-level areas but account for 70 to 80% of Chinese GDP (World Bank, 2007). Almost all pilot cities for economic reform and special

economic zones in China are included in our data set. It is therefore natural that the negative effect of economic development on corruption emerges first in these cities since reforms started earlier there compared to other areas in China and hence also generated more progress during the transitional process.

Even with an efficient instrument we still cannot find solid evidence of the effect of education on local corruption in China. Nonetheless, the negative sign of the education variable in the IV regressions could gives a clue to our previous conjuncture that, similar to that of economic development, the negative effect of education on corruption may emerge as the transition process advances in China. In line with previous findings we also observe that anti-corruption strength is found to strongly deter local corruption in Chinese cities.

Table 14

Relationship between corruption and other deterrents to corruption in Chinese cities

	AETC (2005)			
	OLS		IV	
	(1)	(2)	(3)	(4)
Internet	-0.043**		-0.040**	
	(0.017)		(0.017)	
University		-0.050		-0.052
		(0.068)		(0.078)
Income	-0.16*	-0.19*	-0.15	-0.21
	(0.092)	(0.098)	(0.21)	(0.22)
Education	0.0075	0.012	0.0026	0.0063
	(0.011)	(0.011)	(0.011)	(0.011)
Anti-corruption	-0.011***	-0.011***	-0.012***	-0.012***
	(0.0022)	(0.0022)	(0.0022)	(0.0023)
Big city	0.26***	0.22***	0.26**	0.24**
	(0.086)	(0.084)	(0.10)	(0.10)
Constant	3.62***	3.97***	3.71	4.34
	(1.07)	(1.14)	(2.47)	(2.64)
Observations	120	120	120	120
R-squared	0.27	0.26	0.27	0.26

Notes:

a. Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1.

b. We here adopt the value in 2004 of the internet variable in our regressions.

Now we turn to the relationship between corruption and other deterrence factors (Table 14). Due to the data constraint working with city-level data, we only use internet terminals per capita in a city in 2003 as a proxy for media coverage within a city. Interestingly, we find that more access to the internet substantially lower the local corruption level in Chinese cities. Furthermore, the historical influence of the common law system, which is proxied by the

numbers of church universities founded in cities by Britain and the US before 1922, is also found to exert a negative, though insignificant effect, on local corruption. According to Lenin (1916), China was a semi-colony of western countries headed by Britain in the past. The British influence in China is therefore not as strong as that of the former British colonies. It is therefore plausible that the effect of the common law system on corruption is weaker in China.

Table 15
Relationship between corruption and discretionary power in Chinese cities

	AETC (2005)			
	OLS		IV	
	(1)	(2)	(3)	(4)
Government size	0.11		0.14	
	(0.11)		(0.15)	
Fiscal decentralization		0.43*		0.56*
		(0.23)		(0.34)
Income	-0.16	-0.11	-0.13	0.051
	(0.10)	(0.10)	(0.27)	(0.31)
Education	0.0093	0.010	0.0040	0.0051
	(0.011)	(0.011)	(0.011)	(0.011)
Anti-corruption	-0.011***	-0.011***	-0.012***	-0.012***
	(0.0023)	(0.0022)	(0.0024)	(0.0022)
Big city	0.24***	0.27***	0.25**	0.26***
	(0.088)	(0.089)	(0.10)	(0.10)
Municipality		-0.30**		-0.33**
		(0.14)		(0.15)
Constant	3.57***	2.80**	3.28	0.94
	(1.23)	(1.29)	(3.34)	(3.77)
Observations	120	120	120	120
R-squared	0.26	0.29	0.26	0.27

Notes:
a. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.
b. We here adopt the values in 2003 of the new explanatory variables in our regressions.

In Table 15 we re-analyse the effect of discretionary power on corruption in Chinese cities. We first use the employment share of the city government to represent the size of the city government[4]. We find that the city government size is positively correlated with cities' corruption, but the coefficient is not statistically significant. Following Fisman and Gatti (2002b), we measure the extent of fiscal decentralization by the mismatch between government revenue and expenditure in Chinese cities and find that the fiscal decentralization significantly discourages corruption in Chinese cities. One should note that we add a dummy indicating the four municipalities among Chinese cities in regressions (2) and (4) because

[4] We here cannot use the same measures for government size and fiscal decentralization as in the provincial analysis due to the lack of corresponding data.

they are indeed provincial cities and governments there have greater powers over local public finance than those of other cities[5].

As Cai and Treisman (2006) pointed out, there are three types of government decentralization: political decentralization, administrative decentralization and fiscal decentralization. According to the principal-agent framework, the effect of government decentralization on government corruption depends on two key mechanisms: interjurisdictional competition and local democracy (Bardhan and Mookherjee, 2006). Fiscal decentralization always induces the interjurisdictional competition and hence diminishes local bureaucrats' ability to extract rents in their delivery of services (Brennan and Buchanan, 1980). Political and administrative decentralizations, however, check government corruption mainly through democratic pressure for re-election. It is difficult for us to empirically determine the effect of political decentralization on corruption in China because there is a steadily high political centralization where leaders of local governments are all appointed instead of being elected. The fiscal decentralization is shown to significantly depress local corruption on both a provincial level and in a city level analyses, which supports the argument of Brennan and Buchanan (1980). With the "big city" dummy we further find that the administrative decentralization substantially fosters corruption (statistically significant in all estimations) even when we control the fiscal decentralization. This surprising finding actually is in line with above analysis. The obvious lack of local democracy prevents the administrative decentralization from controlling the corruption of local government in China. Furthermore, according to Gong (2006), without the check of local democracy, an increase in the discretionary power of local governments due to the administrative decentralization often leads to more corruption of local governments.

We finally retest the association between the corruption level and the economic rents in Table 16. Similar to the previous analysis, the trade openness is found to strongly reduce corruption levels in Chinese cities. We then use the fraction of private enterprises among the firms investigated in a city to represent the extent of marketization in the city, since in China the private enterprises sector always increases with marketization. Marketization is also observed to significantly reduce corruption level in Chinese cities, which is in line with the previous results obtained at the province-level.

[5] The "Municipality" dummy equals to 1 if a city belongs to the four municipalities, 0 otherwise.

Overall, the evidence generated using city-level data supports and extends the findings obtained with province-level data providing. We therefore draw a comprehensive picture about the causes of corruption in China.

Table 16
Relationship between corruption and economic rents in Chinese cities

	AETC (2005)			
	OLS		IV	
	(1)	(2)	(3)	(4)
Openness	-0.0029**		-0.0033**	
	(0.0014)		(0.0017)	
Marketization		-0.0061*		-0.0060*
		(0.0036)		(0.0036)
Income	-0.10	-0.17*	-0.015	-0.19
	(0.10)	(0.092)	(0.24)	(0.20)
Education	0.0062	0.0079	0.0020	0.0030
	(0.010)	(0.011)	(0.010)	(0.011)
Anti-corruption	-0.011***	-0.0096***	-0.012***	-0.011***
	(0.0021)	(0.0023)	(0.0021)	(0.0023)
Big city	0.25***	0.18**	0.24**	0.21**
	(0.083)	(0.079)	(0.099)	(0.11)
Constant	2.97**	4.20***	2.01	4.48**
	(1.18)	(1.03)	(2.89)	(2.24)
Observations	120	120	120	120
R-squared	0.30	0.27	0.29	0.27

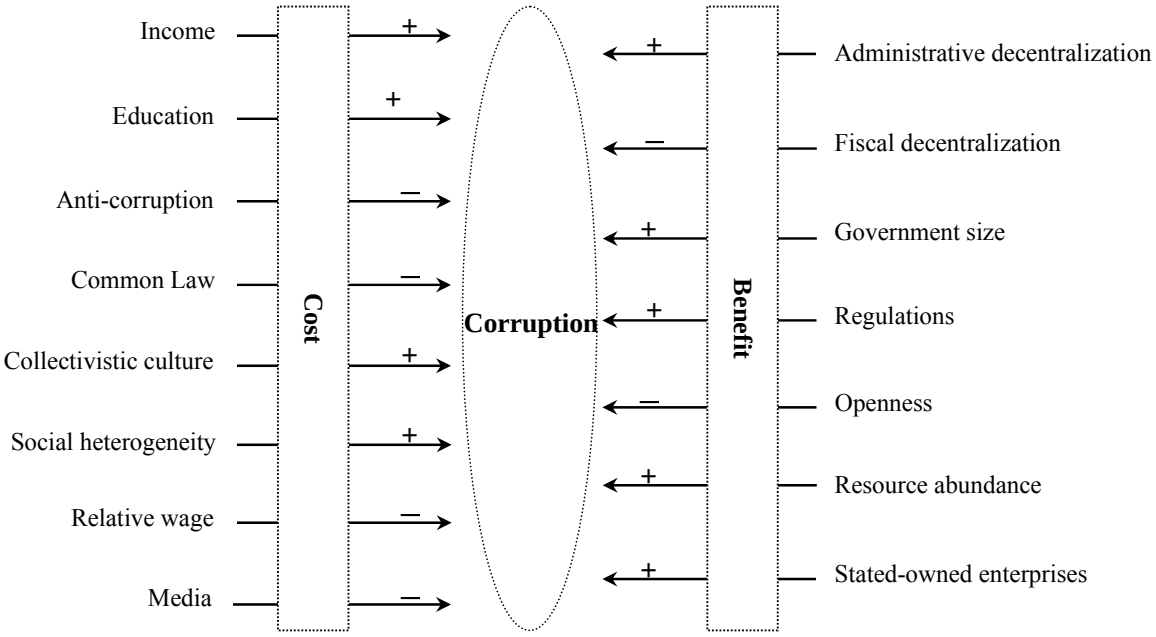
Notes:
a. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.
b. We here adopt the values in 2004 of the new explanatory variables in our regressions.

IV. CONCLUING REMARKS

Cross-country analyses on corruption with subjective survey data are suffering from a number of biases. A comprehensive case study of a representative country might however prove to be a helpful supplement to these studies. In this paper, we investigated in detail the causes of corruption using two different sets of objective data across various regions in China. There are hardly any studies in existence on the causes of corruption that use within-country data and most of those that do exist employ US data. Thus, our study complements previous cross-country studies by isolating possible cultural and institutional differences within each country. We have also complement US studies such as the one conducted by Glaeser and Saks (2006) using panel data and dealing therefore in a better manner with

omitted variable biases and exploring a larger set of independent factors. Furthermore, the use of two different data sets and different measures of corruption allows a robust investigation of the causes of corruption.

Figure 1 Determinants of corruption in China



As shown in Figure 1, we found that with the exception of the positive relationship between income and corruption, cross-country patterns of corruption were generally maintained within China. We nevertheless found evidence that in China the negative effect of income on corruption that is frequently suggested by literature may be only temporarily overwhelmed and may still be in a transitional process. Furthermore in line with Treisman (2007) and Paldam and Gundlach (2009), our results show that the long-run causation between income and corruption is mainly from income to corruption. We, however, do not have enough evidence about the nexus of educational attainment and corruption in China though it seems that this connection follows the same pattern of the pattern between economic development and corruption. As a robust result we observe that anti-corruption efforts significantly depress corruption, while we similarly find strong evidence that North China seemed to be more corrupt than South China probably due to the fact that people in North China are more collectivistic than the people in South China. As a novel result we also find relatively strong

evidence that even media that is under specific control of the government does indeed act as a control instrument for corruption in China. In addition, we now also provide within-country evidence which complements cross-country results that the British common law system does indeed adversely affect corruption. Moreover, our findings support the hypothesis that various social heterogeneities breed corrupt practices. Our results also support the theory that relatively high relative wages within the public sector prevent officials from corruption.

In addition, we have provided concrete evidence that regions with higher degrees of regulation appear to be more corrupt. On the other hand, fiscal decentralization tends to discourage local corruption, which is consistent with Fisman and Gatti (2002a, b), while administrative decentralization seems to encourage local corruption. Finally, clear evidence has been given that openness substantially suppresses the incidence of corruption while an abundance of resources and state-owned enterprises are shown to be the breeding ground for corruption.

APPENDIX: Data Description

Variable	Description	Source
Cases	Provincial registered cases on corruption in procurator's office per 100,000 population	China Procuratorial Yearbooks (1998-2008)
AETC	Average travel and entertainment costs relative to sales of industrial firms investigated in a city	World Bank (2007)
Officials	Provincial number of officials investigated in registered cases on corruption per 100,000 population	China Procuratorial Yearbooks (2004-2008)
Anti-corruption	Regional expenditure on police, procuratorate, court and judiciary per capita	China Finance Yearbooks (1998-2008)
	Confidence in courts of firms investigated in a city	World Bank (2007)
Income	Logarithm of per capita real gross provincial product	China Statistical Yearbooks (1998-2008)
	Industrial output per worker of the city	China City Statistical Yearbook (2004)
Education	Regional fraction of the population over 6 with college completed	China Population Statistics Yearbooks (1998-2008), China City Statistical Yearbook (2004)
Relative wage	Provincial ratio of average government employee' wage to the average wage	China Statistical Yearbooks (1998-2008)
Openness	Regional ratio of import to gross regional product	Provincial Statistical Yearbooks (1998-2008), China City Statistical Yearbook (2004)
Newspaper	Provincial newspapers circulation in a year	Collection of Statistics for Journalism and Publication in China (1998)
Internet	Regional internet penetration rate	China Internet Network Information Centre, China City Statistical Yearbook (2005)
Dissimilarity	Provincial dissimilarity index	Calculated basing the Fifth National Census of China (2000)
Gini	Provincial Gini coefficients	Meng, X., Gregory R. and Wang Y., 2007. Poverty, inequality, and growth in urban China, 1986–2000. Journal of Comparative Economics 33, 710-729.
State-owned	the share of employment of the state-owned enterprise sector	China Statistical Yearbooks (1998-2008)
Resource	Employment share of the mining and quarrying sector	China Statistical Yearbooks (1998-2008)
Han	Provincial population share of Han nationality	the Fifth National Census of China (2000)
Church university	Regional number of church universities founded by Britain and America till 1922	China Continuation Committee (2007), Christian Occupation of China. Beijing, China: Chinese Social Science Press.
British	Dummy which equals 1 when a region was in influence sphere of Britain during the late Qing Dynasty, 0 otherwise	Yang, Z. and Ye, F., 1993. Studies on Semi-colonization of Qing Dynasty. Beijing, China: Higher Education Press.
Government size	The ratio of regional consolidated revenue to Gross Regional Product	China Finance Yearbooks (1998-2008)
	The employment share of the public sector	China Statistical Yearbooks (1998-2008)
		China City Statistical Yearbook (2004)
Fiscal decentralization	The ratio of per capita provincial consolidated spending to per capita central consolidated spending	China Statistical Yearbooks (1998-2008)
	(government expenditure – government revenue) / Government expenditure	China Finance Yearbooks (1998-2008), China City Statistical Yearbook (2004)
Marketilization	The marketization index	Fan, G., Wang, X. and Zhu, H., 2001, 2003, 2006. Reports on the Relative Progress of Marketization in Different Regions in China, China: Economic Science Publishing House.
	Fraction of private firms sampled in a city	World Bank (2007)
Resource	The fraction of employment in the mining and quarrying sector	China Statistical Yearbooks (1998-2008)
North	Dummy which equals 1 when a province is in North China, 0 otherwise	Provincial Statistical Yearbooks 1998
Coast	Dummy which equals 1 when a region is coastal, 0 otherwise	Provincial Statistical Yearbooks 1998
Latitude & Longitude	Latitudes and longitudes of regional capitals or cities	Shanghai Astronomical Observatory Online (http://www.astron.sh.cn/)
Big city	Dummy which equals 1 when a city is municipalities, provincial capitals , cities specifically designated in the state plan and special economic zones, 0 otherwise	China City Statistical Yearbook (2004)

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